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CLAIMS

What is claimed is:

1. A water-soluble, polymeric film comprising Polyvinyl alcohol, a low molecular weight plasticizer, a high molecular weight plasticizer; and a mineral nucleating agent.

2. A water-soluble, polymeric film comprising Polyvinyl alcohol, a low molecular weight plasticizer, a high molecular weight plasticizer, and a salt nucleating agent.

3. The water-soluble, polymeric film of Claim 1 whereby the water-soluble film is used as primary packaging for liquids, pastes or gels comprising 1-85% water by weight

4. The water-soluble, polymeric film of Claim 2 whereby the water-soluble film is used as primary packaging for liquids, pastes or gels comprising 1-85% water by weight

5. The water-soluble, polymeric film of Claim 1 whereby the water-soluble film is a multi-layer film produced from lamination of cold water-insoluble films to existing cold water soluble films, co-extrusion, solution casting, printing of a PE/PVA copolymer or plasticized 99% PVA on an existing cold water-soluble film, or extrusion coating of hot water soluble polymers on an existing cold water-soluble film.

6. The water-soluble, polymeric film of Claim 1 whereby the water-soluble film is a multi-layer film produced from lamination of cold water-insoluble films to existing cold water soluble

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films, co-extrusion, solution casting, printing of a PE/PVA copolymer or plasticized 99% PVA on an existing cold water-soluble film, or extrusion coating of hot water soluble polymers on an existing cold water-soluble film.

5 7. The water-soluble, polymeric film of Claim 1 whereby the water content in the liquid, gel or paste being packaged is 60-85% by weight.

8. The water-soluble, polymeric film of Claim 2 whereby the water content in the liquid, gel or paste being packaged is 60-85% by weight.

10 9. The water-soluble, polymeric film of Claim 1 whereby the cold water-insoluble layer or layers are produced from an polyethylene/polyvinyl alcohol/polyvinyl acetate copolymer, a 95-99+% hydrolyzed PVA or a standard ethylene or propylene based polymer with the incorporation of a maleic anhydride graft polymer for adhesion to the cold water-soluble portion of the film.

15 10. The water-soluble, polymeric film of Claim 2 whereby the cold water-insoluble layer or layers are produced from an polyethylene/polyvinyl alcohol/polyvinyl acetate copolymer, a 95-99+% hydrolyzed PVA or a standard ethylene or propylene based polymer with the incorporation of a maleic anhydride graft polymer for adhesion to the cold water-soluble portion of the film.

20 11. The water-soluble, polymeric film of Claim 1 whereby the film can be produced such that a cold water-soluble layer is in direct contact with said aqueous based liquid, gel or paste as to produce a film capable of utilizing a water seal rather than the conventional heat seal.

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12. The water-soluble, polymeric film of Claim 2 whereby the film can be produced such that a cold water-soluble layer is in direct contact with said aqueous based liquid, gel or paste as to produce a film capable of utilizing a water seal rather than the conventional heat seal.

5 13. The water-soluble, polymeric film of Claim 1 whereby a liquid laundry detergent can be formulated with water levels of 1-85% by weight and affectivity use said water-soluble film as its primary packaging.

10 14. The water-soluble, polymeric film of Claim 2 whereby a liquid laundry detergent can be formulated with water levels of 1-85% by weight and affectivity use said water-soluble film as its primary packaging.

15 15. A method of producing a water-soluble, polymeric film comprising an extruder used to produce the cold water-insoluble layer in claim three can be divided into two separate melt streams and produce two separate layers adjacent to each other thus reducing the chance of producing pinholes and having premature failure of said film due to exposure of water to the cold water-soluble layers of the film.

20 16. The method of Claim 15 whereby the film does not produced smoke during the extrusion process because a layer utilizing high molecular weight plasticizer only is the composition of the outside of the film.

17. The method of Claim 15 whereby a low molecular weight or less hydrolyzed PVA can

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be used on the inside layer of a multi-layer film to decrease seal initiation temperature, and reduce thinning and crystallization at the seal.

18. The method of Claim 15 whereby a liquid, paste or gel is packaged in multi-layer water soluble film that is produced via lamination, co-extrusion, solution casting or melt extrusion on an existing mono or multi layered film.

19. The water-soluble, polymeric film of Claim 5 whereby the multi-layered film randomizes holes in the individual layers of the film to avoid leaks when film is elongated in the filling process.

20. The water-soluble, polymeric film of Claim 6 whereby the multi-layered film randomizes holes in the individual layers of the film to avoid leaks when film is elongated in the filling process.

21. The method of Claim 15 whereby the film is produced from a thermal plastic pellet produced from a carboxylated or sulfonated copolymer produced from the compounded polymer feedstock comprising mixing a polymer with at least one compounding agent and cold pressing the mixture to form the pellets.

22. The method of Claim 21 wherein said thermal plastic is mono or co-extruded solution cast or printed on an existing water soluble film.